

U.S. Environmental Protection Agency
Science Advisory Board
Radiation Advisory Committee (RAC)
Augmented for Consultation on Proposed Updates, Changes and Priorities to the Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM)
Summary Minutes of Public Conference Call Meeting¹
July 26 & 27, 2011

Committee: U.S. Environmental Protection Agency's (EPA's) Science Advisory Board (SAB) Radiation Advisory Committee (RAC) augmented for consultation pertaining to proposed updates, changes and priorities to the Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM) (See Roster. Please note that the superscript numbers here and elsewhere in the text refer to the Materials Cited on the last page of these minutes)¹.

Date and Time: Tuesday, July 26 and Wednesday, July 27, 2011 from 1:00 p.m. to 4:00 p.m. Eastern Daylight Time (See Federal Register Notice)².

Location: This is a conference call with no location announced. All participants were connected via the conference lines.

Purpose: The purpose of this public conference call meeting is for the Augmented Radiation Advisory Committee (RAC) to provide consultative advice on proposed and needed changes and priorities for edits being contemplated to the Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM). The request for the consultation and the charge questions is contained in the June 22, 2011 memorandum request³ from Michael P. Flynn, Director, EPA's Office of Radiation and Indoor Air (ORIA) to Dr. Vanessa Vu, Director of the Science Advisory Board (SAB) Staff Office. The RAC focused on answering the charge questions from the client office, ORIA.

Participating RAC Augmented Members: Dr. Bernd Kahn, RAC Chair, Dr. Susan M. Bailey, Dr. Thomas B. Borak, Dr. Gilles Y. Bussod, Dr. Shih-Yew Chen, Dr. Faith G. Davis, Dr. June T. Fabryka-Martin, Dr. R. William Field (day 1 only), Dr. David G. Hoel (day 1 only), Dr. Janet A. Johnson, Dr. Jonathan M. Links, Dr. Paul J. Merges, Dr. William F. Morgan, Mr. Bruce A. Napier, Dr. Dale L. Preston, Dr. Daniel O. Stram, and Dr. Chen Zhu.

SAB Staff Office: Dr. K. Jack Kooyoomjian, Designated Federal Officer (DFO) for the RAC Augmented for this activity participated.

¹ NOTE: The minutes provide highlights and summaries of individual expert opinion, observations and commentary of subject matter experts, discussions with Agency staff and other participants, as well as highlights and summaries of public commentary. There is no attempt to represent consensus comments in a consultation. In a consultation, the Agency is seeking individual commentary by subject matter experts on the topic being discussed. For the most definitive advice from the subject matter experts, please refer to consolidated comments¹¹, as well as to public comments^{5,6}.

EPA Staff Attendees: Members of the EPA Office of Radiation and Indoor Air (ORIA) Washington, DC Staff Office included Dr. Mary E. Clark, Mr. Jonathan D. Edwards, Mr. Darrell Liles, and Ms. Kathryn K. Snead, MARSSIM Workgroup Chair.

MARSSIM Workgroup Attendees: Mr. David Alberth, DoD – Army; Dr. Ramachandra (“Ram”) Bhat, DoD – Air Force; Mr. Carlos Carredor, DOE; Dr. Steve Doremus, DoD – Navy (day 2 only); Dr. Mark Fuhrmann, NRC; Mr. Darrell Liles, EPA; Mr. Duane Schmidt, NRC; Ms. Kathryn K. Snead, Chair, EPA/MARSSIM Workgroup; and Dr. W. Alexander Williams, DOE.

MARSSIM Contractors Attending: Dr. Harry Chemelinski, SC&A (day 1 only); Dr. Carl Gogolak, SC&A; Ms. Deborah Schneider, SC&A; and Mr. Abe Zeitoun, SC&A (day 1 only).

Other Public Attendees: The members of the public included Mr. Wayne Glines (outgoing President of the Decommissioning Section of the Health Physics Society, HPS); Mr. Douglas P. Guarino, Associate Editor, Inside EPA; Mr. Mark LaDue, Energy Solutions; Dr. Robert Meck, Scientific & Technology Systems, LLC. (recently retired from the U.S. NRC); Mr. John Moen, DOE; Mr. Steven Pary, California Department of Toxic Substances Control; and Ms. Sarah Roberts, President of the Decommissioning Section of the HPS.

Meeting Summary: The meeting followed the issues and general timing as presented in the meeting agenda⁴, except as noted in these minutes with modest time adjustments. Written public comments were provided to the augmented RAC^{5,6}. Verbal comments were also provided by the public at the meeting (see text below for a summary of that discussion).

Welcome and Introductions: Dr. K. Jack Kooyoomjian opened the meeting at 1:00 pm with identification of the participants logging into the call and with opening remarks, and introduced himself as the Designated Federal Officer (DFO) for the Radiation Advisory Committee (RAC) augmented for the consultation pertaining to Revision 2 of the Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM). He explained the purpose of the planned two-day public conference call is to conduct the consultation, and that the RAC augmented for the MARSSIM consultation activity, operates under the requirements of the Federal Advisory Committee Act (FACA) conducts business under the auspices of the chartered SAB. Consistent with FACA and with EPA policy, the deliberations of the augmented RAC are conducted in public meetings, for which advance notice is given, and where he is present as DFO to ensure that the requirements of FACA are met, including the requirements for open meetings, for maintaining records of deliberations of the augmented RAC, and making available the public summaries of meetings, as well as providing opportunities for public comment.

Dr. Kooyoomjian also noted that the members of the augmented RAC were in compliance with Federal ethics and conflict-of-interest laws that apply to them. Dr. Kooyoomjian further noted that Ethics Training was completed by the RAC and all augmented participants and is on file at the SAB, that there is no need for disclosure at this time, other than the individual participants to briefly introduce themselves and their relation to the topic. He

advised that there is no particular matter that may pose a potential conflict of interest, that each participant will disclose relations and experiences to the issues pertaining to the consultative discussions to take place over these two days, and that the biosketches of each participant are posted on the SAB website.

Dr. Bernd Kahn, Chair of the augmented RAC, provided some brief introductory remarks at 1:23 p.m. He cited the charge memo from Michael Flynn³, the written public comments received in advance of this discussion^{5,6}, the power point presentation of today⁷, and the Agency response to the December 1997 MARSSIM Document⁸, and then asked the augmented RAC participants to “log-in,” and introduce themselves and their relation to the topic¹.

At 1:28 p.m., Dr. Kahn invited Dr. Mary Clark, Assistant Director for Science from the ORIA Staff Office, to provide an overview and brief introductory remarks of EPA’s request for a consultation on the MARSSIM topic to the SAB. Dr. Clark, on behalf of the Agency and the Multi-Agency MARSSIM Workgroup, thanked the SAB for assembling the augmented RAC for this consultation and for the opportunity to receive feedback from subject matter experts on specific issues that the Multi-Agency Workgroup, and ORIA staff will need to focus on as they develop MARSSIM Revision 2. She noted that this consultation pertaining to MARSSIM Revision 2 will result in a revised draft MARSSIM coming back to the augmented RAC for review.

Overview of MARSSIM:

Dr. Clark introduced Ms. Kathryn Snead, Chair of the MARSSIM Workgroup to begin the presentation entitled “MARSSIM Revision 2, Consultation with the SAB-RAC, July 26, 2011”⁷. Dr. Kahn respectfully requested starting on page 12 of the briefing materials. Ms. Snead touched on Dr. Colleen Petullo having formerly chaired the MARSSIM Multi-Agency Workgroup, and cited briefly the four Federal Agencies, DoD, DOE, EPA, and NRC making up the MARSSIM Multi-Agency Workgroup. She acknowledged that it is independently chartered under the Interagency Steering Committee on Radiation Standards (ISCORS) umbrella since 2007, and that it is part of a family of 3 Multi-Agency documents that have been developed over the years, namely MARSSIM (published in 1997 and updated in 2001), MARSAME (Multi-Agency Radiation Survey of Materials and Equipment, published in 2009), and MARLAP (Multi-Agency Radiation Laboratory Analytical Protocols, published in 2004). Ms. Snead stressed that all these are technical documents and not policy documents, and all have been reviewed by the SAB’s RAC. The basic premise and main positive attribute of all these technical documents is that the participating Agencies will work cooperatively to have one technical document to work from within the Federal government, despite differences in charters, statutes, and implementing regulatory activities.

MARSSIM covers real property (surface soils and building surfaces), and provides defensible and rigorous surveys for cleanup, especially for final status surveys. It incorporates historical site knowledge and a graded approach to the survey effort, and recommends a two-tiered approach for surveys using scanning and direct measurements or samples. MARSSIM is widely used by the NRC in decommissioning sites, and by DOE, DoD, EPA, and the States for

cleanup of sites. It is particularly useful as it provides an agreed-upon approach at sites having multi-party agreements.

MARSAME is a supplement to MARSSIM and provides defensible and rigorous radiation surveys for cleanup operations and interdiction incorporating a graded approach. It addresses surficial and volumetric contamination and difficult-to-measure areas. MARLAP also provides defensible and rigorous protocols for radiation measurements performed in a laboratory setting. MARLAP was issued by a separate Workgroup (MARLAP Workgroup) with specialized knowledge and included additional agencies (USGS, DHS, FDA and NIST), along with DoD, DOE, EPA and NRC.

MARSSIM planned revisions were briefly highlighted by Ms. Snead. They consisted of such topics as the following:

- updates on treatment of measurement uncertainty and measurement methods,
- a Scenario “B,” approach which assumes to pass unless proven otherwise,
- an increased emphasis on interfacing with the regulator during survey design,
- using user comments (i.e., “lessons learned”) during the past ten years of survey design,
- providing consistent definitions and terms consistent with related documents between MARSSIM, MARLAP and MARSAME, and
- a better discussion on “hotspots” and UMTRCA (Uranium Mill Tailings Radiation Control Act of 1978, Public Law 95-604) standards, since MARSSIM did not explicitly address UMTRCA.

Ms. Snead touched on the process that was used to solicit and incorporate public comments, introduced the charge questions, and then asked ...”What should be the priorities? She asked the RAC Augmented for the MARSSIM Consultation the following charge questions³:

1. *The MARSSIM Workgroup has proposed a number of significant changes to MARSSIM, which if implemented, will result in Revision 2 of the document. Please comment on the applicability and appropriateness of proposed changes.*
2. *Does the SAB have any recommendations for additional changes or improvements? Why does the SAB believe that these additional changes are warranted?*
3. *The list of changes proposed by the MARSSIM Workgroup represents the Workgroup’s best judgment as to the highest priority changes, given limited resources for implementation. Please comment on the appropriateness of the Workgroup’s prioritization of the changes selected.*

Ms. Snead completed her presentation at 2:00 pm. She concluded with the comment that the “Elephant in the room,” is the amount of funding available for these changes, noting that the easy changes can be done, but the more difficult and complicated changes require time, effort, coordination and most importantly, funding. She felt that, depending on the comments received and the funding situation, the MARSSIM Multi-Agency Workgroup can be committed to look at some of the complicated changes.

Dr. Kahn complimented Ms. Snead and the MARSSIM Multi-Agency Workgroup for the degree of effort and coordination that they thus far have put into the planning exercise for the proposed revisions to MARSSIM. Dr. Mary Clark reminded everyone that, as a consultation, the MARSSIM Multi-Agency Workgroup is looking for individual expert comments, and it is not necessary to develop consensus commentary. It is expected that the RAC members will provide their individual comments directly to the RAC DFO, Dr. Kooyoomjian to convey to all parties following this public setting. It is anticipated that the individual comments will be compiled and posted onto the SAB Website for access to all interested parties¹¹.

Public Comments:

At 2:07 p.m., Dr. Kahn asked if there were any members of the public who wished to address the augmented RAC. Dr. Kooyoomjian noted that two written public comments were received and were posted onto the SAB's Website for this meeting. They include the following: Comments from the Health Physics Society (HPS) submitted electronically on July 21, 2011 by Kathryn H. Pryor, CHP, President of the HPS⁵, and comments received electronically on July 24, 2011 and previously submitted for revision 2 of MARSSIM to the MARSSIM Multi-Agency Workgroup by Dr. Robert A. Meck and also provided to the SAB Staff Office on February 12, 2011⁶.

Dr. Kooyoomjian recognized Ms. Sarah Roberts from the Oak Ridge Associated Universities (ORAU) representing the Health Physics Society (HPS) Decommissioning Section. Mr. Wayne Glines from the HPS was also on the teleconference call. Ms. Roberts noted that 5 or 6 of the proposed changes in the MARSSIM Revision 2 presentation by Ms. Snead are right in line with what ought to take place in revisions to MARSSIM, and that the HPS agrees that there is a need for the following:

- An updated discussion on measurement uncertainty. She noted especially that this information needs an implementable template for users,
- Nomenclature coordination is needed between MARSSIM and MARSAME,
- An expanded discussion is needed, such as is available on Dr. Eric Ablequist's doctoral dissertation discussion of "hotspots." (NOTE: The full citation and hotlink was provided in the HPS written public comments.)⁵ She hopes that the limits are reasonable and not unnecessarily restrictive,
- Scan-only technology in MARSAME should also be present in MARSSIM,
- Improved data logging, GIS software, etc. technology changes are needed improve survey design, and
- Methods to demonstrate compliance with sub-surface contamination are needed, but she noted that this is not an easy task.

Ms. Roberts concluded her comments at 2:14 p.m.

Dr. Kooyoomjian recognized Dr. Robert A. Meck at 2:14 pm. Dr. Meck commented on the topic of elevated activity. He observed that typically when sites are small and activity is high, at some point it is more effective to dig up the materials in question and send it to another site

when elevated activity is measured and observed. He cited Tables 1-2 and 1-3 in the MARSSIM for similarities and differences and the opportunity for coherent and helpful documents. He remarked that technological advances for space-correlated data are now available and very effective, noting that each data point is independent of the others. However, there is a need to have the data points correlated and demonstrate whether they are or are not independent. He thought that in the operations aspects of the of the Multi-Agency MARSSIM Workgroup, there is a need for a more user-friendly website, noting that contacts, such as e-mail addresses can be more user-friendly.

At 2:30 pm, Dr. Dale Preston observed that it appears that the list of 7 proposed changes was reduced from a larger list of proposed changes. He thought it would be helpful to look at the larger list of proposed changes, and then ask what the criteria might be applied to the proposed changes, and can you (referring to Ms. Snead and the MARSSIM Multi-Agency Workgroup) condense these and get them back to us? Dr. Thomas Borak observed that it would be helpful to look at the collective collated comments received by the Workgroup. Dr. June Fabryka-Martin thought that it might be helpful to look at the Agency's response to the RAC's previous report from 1997, as well as the RAC comments on the MARSAME review.

Dr. Meck observed that 10 years has elapsed in using MARSSIM, and that training is needed on the MARSSIM Revision 2 that will be forthcoming. He further observed that there is across-the-board agreement among the Federal regulators that the MARSSIM document is sound, but that training needs to be a fundamental part of their implementation strategy for MARSSIM Revision 2. He concluded his remarks at 2:38 pm.

There being no additional public commenters wishing to speak, the public comments concluded at 2:38 pm.

Open Discussion by RAC:

Dr. Gilles Bussod recommended that the RAC should address some items that are not on the short list. For instance, he strongly believes that the discussion of sub-surface contamination is an important enough suggestion to merit further discussion and prioritization. He believes that that there should be a plan for developing a sub-surface report someplace in the mix of options.

Ms. Snead offered that activities focused on sub-surface soil are likely to be quite an expensive undertaking that may require a supplemental document or a full, separate document, because it is such a complicated subject. She acknowledged that, as a Workgroup, we can say that at least it has to be discussed.

Dr. S.Y. Chen thought that it would be helpful if the seven priority areas listed on the briefing, page number 19 were ranked by importance and also by ease-of-approach⁷. Additional discussion focused on the briefing, where such items as treatment of measurement uncertainty, update of measurement methods, choice of Scenario B, increased emphasis on regulator interface during survey design, use of "lessons learned," focusing on consistent definitions, and incorporation of a better discussion on "hotspots," and UMTRCA standards were highlighted. In

his remarks, Dr. Chen indicated that he appreciated the graded approach, such as in the instance where a hospital is trying to set its priorities, and they need to create an appropriate rationale.

Dr. Kahn thought that for each of the seven priorities, it would be helpful to have the appropriate page number or section number citation cross-referenced. Ms. Snead remarked that they could do this and create such a cross-walk. Dr. S.Y. Chen also thought that incorporation of illustrated case studies might also be helpful.

Dr. Borak asked if there was another power point presentation on measurement uncertainty. Ms. Snead noted that they are just coming out with preliminary ideas now, and the Workgroup will prepare more this evening for tomorrow's session.

Dr. Bussod expressed some concern about stating the 7 priority areas, and not bringing forth other recommendations. He is a little troubled that this will be a partial agenda. For example, for tomorrow's teleconference, he anticipated that we should have additional items to consider and discuss.

Dr. Kahn encouraged each participant to prepare their best suggestions for tomorrow's discussion, which may be different than today's thoughts.

With respect to treatment of measurement uncertainty, Dr. Dale Preston thought that the Bayesian approach used to measure uncertainty in MARSSIM is popular and helpful in its current form, because it applies to the users and has an ease of application. However, he sees the opportunity for improvements.

Dr. Stram thinks that the health physics community may already think that the current MARSSIM manual is technical and practical enough in its current form and believes that they may likely view the current version as simple, as well as effective enough to use in practice. He asked ... "What would they think about the proposed revisions?"

Dr. Borak observed that every time he talks to people who are familiar with statistics, such as how MARSAME uses Scenario A & B, they tell him that the material is presented as "You are guilty!" and needs the applicant to prove that it isn't present. He believes that this approach to the Scenario exercise could drive everything, and, in fact, could be a "reward" for ignorance.

Dr. S.Y. Chen wasn't sure that the Workgroup is hitting the mark in some areas. Ms. Snead responded that the Workgroup is tracking the International Organization for Standardization (ISO) and National Institute of Standards and Technology (NIST) guidance to keep up with the state-of-the science, but also is trying to keep the requirements practical and implementable.

There appeared to be some consensus emerging, such as with Mr. Napier and Drs. Bussod, Preston & Stram and others regarding the benefits of being more in line with other existing government regulations and guidance such as with ISO & NIST. However, it was still

recognized as an open question, and it was further acknowledged that there are difficult issues to be resolved. Dr. Kahn thought that the discussions that followed regarding identification of this problem will place the Multi-Agency Workgroup in a better position to articulate and identify more complex problems and relationships. He also thought that the Workgroup would appreciate the value and utility of field application.

Dr. June Fabryka-Martin asked to what extent would the treatment on applicability in MARSSIM apply to MARSAME, and do we have a “simple cook-book” approach to MARSSIM? She observed that currently MARSSIM is a two-dimensional approach, and that MARSSIM needs “pointers.” Dr. Kahn remarked that he now understands that CQ #2 pertaining to changes or improvements recommended does not necessarily focus on the 7 priorities.

Ms. Snead responded that over the years, we have people who have come to us (the Workgroup) to demonstrate scanning technologies, and that this application/technique has vastly improved since 1995. She further noted that scanning techniques can actually detect and they are proposing to include them into MARSSIM.

Dr. Janet Johnson observed that scanning needs some correlation with laboratory measurements, and the benefit is that it allows fewer soil samples to be taken (hence, less expense) if you have a valid correlation. She observed that a big question is when the surface is considered less than 12 inches deep.

Dr. Bussod noted different penetration volumes for scenarios and mixing in two and three-dimensions as complications. Dr. Borak thought that we should also be commenting on instrumentation in this context. Dr. Gilles Bussod discussed whether something is gained from more complex approaches, and what might its value be for field application. He thought this discussion needs to play out in the MARSSIM context.

A discussion followed on Scenario B and its implications. Dr. Preston observed that there are reasons to look at the burden of proof on a Scenario B situation. Ms. Snead offered that Scenario A was chosen exactly for the reasons stated by Dr. Preston, and that a survey needs to have the appropriate amount of rigor. Dr. Fabryka-Martin observed that Scenario B might be confined to Class C sites. Ms. Snead offered that there are cases where Scenario B is the only option. Dr. Merges observed that in his experience as a regulator, he has instructed his staff to do a more robust examination.

Dr. S.Y. Chen asked when following the MARSSIM methodology as specified, how do we assure ourselves that a party has followed the proper protocol? Ms. Snead indicated that there are situations that occur where too many regulators give feedback and they typically do not get enough information from the applicant. She also acknowledged that often the cases arise where people using MARSSIM do not know exactly what questions and decisions to take to the regulators. In some situations, the regulators are not being consulted, and some coordination here would be helpful.

Dr. Kahn observed that in the beginning of the process of any cleanup, the responsible party should submit a plan to the regulator. Dr. Jan Johnson asked, “Does this belong in a technical document to say “Gee Guys, talk to your regulator.” Dr. Kahn simply notes that there needs to be a plan that is approved by the regulator. Dr. June Fabryka-Martin thought it was a good suggestion offered earlier in the discussions to make it easier for the users of MARSSIM to have access to those “lessons learned” on the MARSSIM Website. Dr. S.Y. Chen further offered that more recently the use of social media has been effective in sharing information. A discussion also took place on the need to eliminate inconsistencies.

The issue of “hotspots” was considered, including discussion on the contributions from Eric W. Abelquist’s doctoral dissertation on this subject. Various panelists and participants weighed in on this topic. Dr. June Fabryka-Martin, Dr. S.Y. Chen, Mr. Wayne Glines, Dr. Janet Johnson, and Dr. Paul Merges offered their perspectives. Topics covered hotspot limits, hotspot release criteria, and whether it is concentration or dose-based. A discussion also took place on the Uranium Mill Tailings Radiation Control Act (UMTRCA) standards and surface DCGLs in relation to the “hotspot” analysis, and how this plays into MARSSIM as a generic document. Dr. Merges was under the impression that MARSSIM does not address standards, because it is a technical document. He further opined that the original MARSSIM refers to dose or risk-based standards, but that the current MARSSIM does not address UMTRCA. It was felt that perhaps MARSSIM could reference these other documents.

There being logical completion in the discussions, Dr. Kahn adjourned the conference call on Day #1 to reconvene tomorrow at 1:00 pm on Wednesday, July 27, 2011. The conference call was recessed for the day at 4:01 pm.

Summary & Action Items from the July 26, 2011 Public Conference Call:

This brief summary captures those items of interest to the augmented RAC in preparation for the next day’s discussions as follows:

- 1) Ms. Kathryn Snead will coordinate with the Multi-Agency MARSSIM Workgroup members to prepare a list of priorities to share with the RAC Augmented for MARSSIM Revision #2 for discussion at the Wednesday, July 27, 2011 session (See Item #9);
- 2) Be prepared for the 2nd day for a “Round-the-Table” comment session to convey your individual comments to the Multi-Agency MARSSIM Work Group; and
- 3) Dr. Kahn would like to see more engagement with the individual Multi-Agency MARSSIM Workgroup members and the RAC members augmented for this MARSSIM Consultation on Day #2.

Day #2: Reconvene RAC Augmented for MARSSIM Consultation on Proposed Revision #2:

At 1:00 pm through 1:10 pm, the participants logged on to the call and the DFO for the RAC augmented for the reconvened MARSSIM Consultation, Dr. Kooyoomjian, extended a

brief welcome to all the participants. Dr. William Field, a member of the RAC, and Dr. David Hoel of the RAC Augmented for the MARSSIM consultation were unable to participate in Day #2 of the consultation activity. Dr. Faith Davis, a member of the RAC, was available for 2 hours in this session on Day #2.

Ms. Kathryn Sneed took the opportunity to pause and reflect upon the significant contributions made by Dr. George Powers of the U.S. NRC, who recently passed away. She cited his significant contributions as a member of the Multi-Agency Workgroup on MARSSIM, his contributions to the development of MARLAP, as well as his contributions on several U.S. Nuclear Regulatory Commission NUREG publications over the years. She remarked that Dr. Powers truly was a visionary on encouraging development of the Multi-Agency documents and other products that were developed collaboratively by the dedicated technical professionals in the participating Federal agencies on the Multi-Agency Workgroup, and that these documents that were developed and prepared in this collaborative and collegial manner are used by many people. She also recalled Dr. Powers' sense of humor and his ability to work so well in a positive manner with many of his colleagues in the multi-agency settings.

Dr. Kahn provided an opportunity for Ms. Sneed to introduce the Multi-Agency Workgroup members. This included introductions to Mr. David Alberth of DoD – U.S. Army (Aberdeen, MD proving Ground), Dr. Ram Bhat of DoD (U.S. Air Force), Dr. Mary Clark of EPA/ORIA, Mr. Carlos Carredor, DOE, Mr. Darrell Liles of EPA, Mr. Duane Schmidt of the NRC, and Dr. Alexander Williams of DOE. Other participants introduced included Ms. Deborah Schneider of SC&A, a contractor to EPA, Mr. Douglas Guarino from Inside EPA, and Ms. Sarah Roberts representing the Health Physics Society.

Since Day #1 was involved in formal presentations by Ms. Sneed, Dr. Kahn encouraged the augmented RAC for Day #2 of this consultation to engage more proactively in discussions with the MARSSIM Multi-Agency Workgroup members.

Clarifying Public Comments:

At 1:13 pm, Dr. Kahn invited Ms. Sarah Roberts representing the HPS to provide clarifying remarks from the previous day's discussion on the Abelquist Doctoral Thesis and related papers pertaining to the topic of "hotspots." She remarked that the Abelquist study concluded that external pathways are not necessarily the hotspot sources, and that research pertaining to the distance of the receptor from the hotspot, and the research on multiple hotspots are treated as a part of the distribution. She thought that the MARSSIM Multi-Agency Workgroup should consider upper limits of hotspots and that it would be useful to describe the contaminant distribution for hotspots. She also cautioned that not all hotspots might be detected, but that all parties should continue to comply with the usual practice of applying the ALARA (As Low As Reasonably Achievable) principle. It is a reasonable conservative assumption to consider the receptor as always being on the hotspots. Ms. Roberts concluded her remarks at 1:16 pm.

Open Discussion:

At 1:17 pm Dr. Kahn remarked that there needs to be an effective conversation between the SAB Panel and the MARSSIM Multi-Agency Workgroup members. He assumed that the Workgroup members have considered the 7 items and have opinions and written materials on this. For example, with an updated treatment of measurement uncertainty, it would seem that it would be advantageous to keep measurement of uncertainty as simple as possible, so field people can take care of it and will be encouraged to use it. With regard to point #6, providing consistent definitions is like motherhood and apple pie.

Dr. Morgan indicated that he was impressed with the Multi-Agency Workgroup organization. However, it was unclear to him how to deal with the “Sub-Surface” issues, since a lot of materials are buried. He was interested in the possible role of the Multi-Agency Workgroup as an organization in setting standards.

Ms. Kathryn Snead suggested that with regard to the conversation on the 7 priority items currently on the list, there is broad consensus in the MARSSIM Multi-Agency Workgroup that these activity areas are appropriate. She thinks that what may be needed is identification of those items that are not currently on the list, or those items that could replace something already on the list. She asked, “Do we have our priorities in the right order?” [NOTE: The supplemental information requested by the RAC was e-mailed by Ms. Snead to Dr. Kooyoomjian following the first day’s discussion and was posted onto the SAB Website for access by all for the second day public session.]¹⁰

Ms. Snead observed in response to Dr. Morgan’s comments, that the interface where MARSSIM and some sub-surface investigation begins impacts what the assumptions are to convert to a Derived Concentration Guideline Level (DCGL). A change in the DCGL reflects a change in the assumptions used to translate dose or risk into concentration. This could affect survey design and gives us an idea as to where the interface begins.

Mr. Duane Schmidt of the NRC remarked that he is a user of MARSSIM. With respect to the question of definition of sub-surface, the typical survey is based on scans or surface contours. However, the homogeneity of the buried contaminants simply is not known. Dr. S.Y. Chen remarked that he appreciates Duane Schmidt’s perspective, and while we can use RESRAD, and may couple it with modeling, we still need a clear definition of sub-surface.

Dr. Gilles Bussod observed that establishing and characterizing subsurface involves boreholes, modeling, as well as difficult and expensive testing. At the near surface, we need to approach the definition of near surface for samples in the topsoil and soil horizon. The specific point being made is that the current scope of MARSSIM is to the near-surface. The reality is that soil and man-made cover in most national laboratories have to be dealt with all the time.

Dr. Ram Bhat of the U.S. Air Force, and a Workgroup member, observed that we (the U.S. Air Force) have been dealing with this problem over the past decade with basic physical measurements. For instance, in some cases they have found many drums in specific areas, and

have spent serious funds (sometimes approx. \$50 million dollars at a site) to remediate the identified areas. In some cases, the groundwater was 100 foot below the surface and was not contaminated. However, he recognized that this is still a regulatory problem that has to be dealt with.

Dr. Kahn advised that if the area of concern is close to the surface, MARSSIM could be expanded somewhat to cover that sub-surface issue. Dr. June Fabryka-Martin agrees with all that has been said with regard to the importance of considering sub-surface issues. She thought that the Workgroup could have a section in MARSSIM regarding sub-surface survey design, the data Quality Objective (DQO) process, and why assumptions, complications of transport pathways, and other aspects are or are not relevant and why.

Dr. Jonathan Links observed that he likes Dr. Giles Bussod's distinction on soils and sub-soils and thought that the MARSSIM Workgroup should not ignore the sub-surface issue.

Dr. June Fabryka-Martin wondered what aspects of MARSSIM might address the Uranium Mill Tailings Radiation Control Act (UMTRCA). Dr. Alexander Williams of DOE and a MARSSIM Workgroup member advised that he was in a previous position at the US EPA to write standards 30 years ago pertaining to such topics as the risk of radon in structures, as they pertain to remediation. He advised that, according to the International Symposium on Computational Structural Mechanics (ISCM), the sub-surface is 6 inches. From his perspective, the biggest difficulty in MARSSIM is that there is no discussion on UMTRCA standards. However, UMTRCA standards are widely used to address such subjects as Technologically Enhanced Naturally-Occurring Radioactive Material (TENORM), such as Uranium and Thorium. MARSSIM is looking at much larger areas of land. The release criteria guide UMTRCA. He believes that there is a need to mesh regulatory standards with the technical approach in MARSSIM.

Dr. Paul Merges thought that UMTRCA standards have to be related to ALARA standards.

Dr. Bussod believes that MARSSIM, as a field-oriented document is currently just "scratching the surface" with regard to the sub-surface topic. He believes that MARSSIM in its current form, is not consistent with or sufficient for the technologies necessary to relate to the geophysical and hydrogeological aspects for such things as "hotspot" detection, migration of pollutants, identification of plumes, etc. as well as topics such as ground water flows to drinking water and surface flows to rivers. He believes that dealing with the sub-surface involves a huge amount of legacy waste issues and that MARSSIM is currently in no position to address this in a meaningful way at the scale it is currently happening. Yet, the current and evolving regulatory compliance aspects require huge soil assessments and remediation.

Dr. Alexander Williams observed that the UMTRCA standards indicate that risks from radon in structures and homes is high.

Dr. June Fabryka-Martin asked if EPA is going to use the current UMTRCA standards. Ms. Kathryn Snead advised that the EPA is, in fact, using the current UMTRCA standards. Dr. Fabryka-Martin thought that there might be an additional step pertaining to independent verification of this. Ms. Snead thought that was a good comment. Dr. June Fabryka-Martin thought that it would be helpful to have discussion and agreement on the initial survey and area classifications within the revised MARSSIM, just like MARLAP has for Laboratory Analytical Protocols.

Dr. S.Y. Chen thought this is a good point. He advised that MARSSIM is not meant to be imposed on users, and it's application is voluntary.

Dr. Janet Johnson observed that EPA's amount of 5 picocuries did not take into account indoor radon. The sub-surface Guideline Concentration Level using RESRAD could look at sub-surface versus near-surface containment. It was observed that RESRAD has a natural dividing line for water pathways.

A discussion followed on the lack of funds to conduct sub-surface or near-surface analysis. It was thought that there could be an attachment or addendum regarding this topic in the MARSSIM Revision 2.

Dr. Paul Merges addressed Scenario B. He was glad to hear the previous comments. He further observed that there are statistical packages currently in MARSSIM which are very sophisticated and go substantially beyond the expertise of most state officials. He thought that one option to address this problem is to provide a request for a "loaner statistician" from another agency. Dr. Merges observed that MARSSIM has been an effective "Umbrella process" to address surface as opposed to sub-surface. While MARSSIM is timely, it is not perfect, and he thought it makes sense to prioritize the proposed changes based on getting the "most bang for the buck."

Dr. Kahn expressed appreciation that the NRC tries to make staff available for those who need assistance with MARSSIM and other related issues. At 2:05 pm, Dr. Kahn went "around the table" to solicit comment from the other RAC participants.

Dr. Chen Zhu had no comment at this time and passed for now.

Dr. Susan Bailey, as a radiation biologist, sees where the research intersects with the practical field applications. While she is not involved in day-to-day measurement issues, she agrees with the comments of Dr. Kahn and others that MARSSIM revisions should clearly retain a "field-friendly" orientation. She also believed that the training is important and necessary for people to effectively use the document and apply the new technologies. Dr. Kahn agreed with her comment and re-emphasized the importance of continued training to encourage the effective use of the MARSSIM.

Ms. Snead advised that the EPA offers free open training to government employees (federal, state & tribal). She acknowledged that funding comes and goes with the vagaries of the

federal funding cycle. With regard to the future of MARSSIM training, they are considering a paper exercise and to encourage students to bring their own laptop computers.

Dr. Susan Bailey asked if personnel in the field are implementing MARSSIM. Ms. Snead advised that in the field, they are using laptops and implementing MARSSIM.

Dr. S.Y. Chen advised that he hopes the Agency and the Workgroup doesn't just treat MARSSIM as a paper and pencil exercise, and strongly encouraged that training should be augmented with the introduction of case studies.

Dr. Jonathan Links felt that there is an incredible amount of "Déjà vu" regarding the MARSAME studies, and he sees a connection here with revisions being proposed to MARSSIM. He recalls that there was statistical training and a great deal of effort was expended to understand the intended audiences and users of such a manual.

Dr. Thomas Borak observed that MARSSIM is a technical, scientific document. However he recognized that it is also a field manual, and as such it should therefore include operational details and scenarios to keep it as practical and relevant a tool as possible. Further, he is a firm believer in the use of appendices to capture those details (the scientific information). He also felt that operational schemes should be in the bulk of the document to guide users. For instance, there should be information on the regulator interface, as well as training and scenarios, especially for the Scenario A & B exercises oriented on how you choose the Null Hypothesis. If you say, for instance, that the Null Hypothesis is Zero, then you could get lazy and not take measurements. Also, practical knowledge of how to calibrate instruments would be very important in such a manual.

Dr. Borak agrees with Dr. Jan Johnson that it might be a good idea to review the risks that are associated with deep or near-surface radiation. There is a need for a discussion on near-surface hotspots, but also in the context of a cost-effective way to deal with those risks.

Dr. S.Y. Chen observed that the components in MARSSIM are not stand-alone, because they are in-fact interacting. For instance, if you are going to clean up with a back-hoe, the 15 cm contamination definition for surface soil cannot be derived abstractly; it needs to be practical. He thought that Ms. Kathryn Snead's supplemental information provided¹⁰ was very helpful, and appreciated the quick turn-around from yesterday's discussion. For example, #5 of the set of 12 proposed revisions dealing with MARSSIM Revision 2, the Subsurface has high importance, but the difficulty is low.

Dr. Ram Bhat (U.S. Air Force participant on the Multi-Agency MARSSIM Workgroup) recognized Dr. S.Y. Chen's contributions in developing RESRAD application codes for sub-surface. He observed, however, that it may not make sense to retain sub-surface in the current MARSSIM for radionuclides. In response, Dr. S.Y. Chen observed that RESRAD already has that component for radionuclides, but perhaps we need to postpone sub-surface for the present.

Drs Faith Davis and R. William Field were not on the line for them to offer commentary at this time.

Dr. Jonathan Links thought that we ought to take the assemblage of items made thus far, such as the collection of items in Attachment C ⁹ (which listed the 7 items for consideration in revision 2 of MARSSIM), the 6 items in the Health Physics Society letter⁵, the 12 items in Kathryn Snead's recent e-mail¹⁰, and prepare a cross-walk. He thought that there are two items that are not addressed, namely 1) Sub-surface, and 2) HPS point #4 to adopt the MARSAME for scan-only. Dr. Bernd Kahn observed that the HPS point #2 recommending consistent terminology and nomenclature between MARSSIM and MARSAME also relates to point #2 pertaining to equipment and updated measurement methods in Ms. Snead's materials^{9,10}. Dr. Links stood corrected on this and acknowledged that point.

Ms. Kathryn Snead discussed the brain-storming process undertaken by the Multi-Agency MARSSIM Workgroup, which also included a look at resource constraints, and advised that they had come up with 7 items that appear to be the high priorities among the items that they would like to do. Dr. Kahn observed that Item #6 regarding definition of terms doesn't seem like a lot of work, and he thought it should certainly go forward.

Dr. Bussod offered that the whole concept of selecting priority items and activities should be based on scientific application and merit, and that in his opinion, the issue of resources shouldn't really be factored into the mix at this time. He believes that the judgment call should be based solely on relative scientific merit.

Dr. S.Y. Chen thought that clarification of each item as independent from the others could help consolidate the activities. For instance Item #5 of 12 dealing with MARSSIM and the Subsurface could be ranked for difficulty to implement as well as being ranked for level of importance.

Ms. Snead discussed Item #11 (implementing sign test with background present) and the use of the Wilcoxin testing. It was thought that it would be helpful in future revisions if the MARSSIM Revision #2 to include a description on how to approach the issue, and not the level of difficulty to address the issue. For item #5 regarding MARSSIM and the subsurface¹⁰, Ms. Snead acknowledged that she clearly understands from the discussions during the public conference calls, that the Multi-Agency Workgroup now has the feedback from the RAC augmented for this specific MARSSIM consultation that sub-surface, while difficult to implement, should be included.

Dr. S.Y. Chen asked what does Item #6 pertaining to smears mean as "a possible policy issue?" He sees the possibility that 4 federal agencies may "butt heads," and that it may not be an "easy path forward" at this time. Dr. S.Y. Chen further observed that in MARSAME, smears were incorporated because of SAB recommendations. Dr. Kahn observed that DOT "lives by" smears, whereas other agencies think that they are "amateurish" and imprecise for a variety of reasons.

Ms. Snead acknowledged as they seek additional “food for thought” on revisions, she recognized that there will be quite a range of opinions on a variety of topics.

Dr. William Morgan has no comment at this time.

Mr. Bruce Napier, in commenting on the list of 7 items observed that it is his opinion that the first 3 are structural changes, while the next 4 are easy changes. The first 3 involve significant re-writes, and will cause a lot of work, but it is his opinion that they should be done. He was pleasantly surprised that MARSSIM had the content dealing with statistical techniques.

Public Comment: At 2:45 pm, Dr. Kooyoomjian called for public comments. There were none, so the open discussion continued.

Open Discussion Continued:

Dr. Dale Preston commented again on the issue of measurement uncertainty. He recognized that it has the most sophistication and analysis and could be an issue for Item #1 pertaining to multiple surfaces and other guidance found in NUREG 1505 and 1507¹⁰. His second comment pertains to Scenario B. He prefers that Scenario A as a tougher criteria to determine if it is a cleaned-up site. He suggested that what is needed is criteria when to use Scenario B.

Dr. Daniel Stram had a direct question with regard to Scenario B, and asked if there is an explicit requirement on the power of the test? Ms. Snead responded that this is a really good question and that he may have stumped her on this at the present time.

Dr. Carl Gogolak (consultant to MARSSIM Multi-Agency the Workgroup) discussed Scenario B versus Scenario A. He noted that in the Data Quality Objective (DQO) process, it looks at the probability of Alpha and Beta (Type I and Type II errors). The probability of calling a clean site “dirty” and the regulator’s responsibility to specify the tolerable error rate is a part of the process. If the Scenario B exercise does not have control of what the regulator is concerned with, we don’t want to get rewarded for a “sloppy job.” It is his view that in Scenario B, there is more pressure on the regulator to get it correct.

Dr. Stram asked if there are benefits in the field on testing Scenario B? He did not get a strong sense of Scenario B as a more field-practical choice.

Dr. Gogolak responded that Scenario A is probably better, and that in his view, Dr. Stram’s impression is not actually correct. He offered that some people have a goal to clean up a site to background, and you have a Scenario B where the DCGL is set to zero (background). You could recommend Scenario A or B depending on the circumstances.

Dr. Stram thought all this discussion bolsters the need for an updated treatment of measurement uncertainty in MARSAME. Dr. Gogolak’s answer to this is, unfortunately “yes,” and “no.” What Dr. Gogolak was illustrating is that if you do not know your measurement

uncertainty, you might not get an overly optimistic Minimum Detectable Concentration (MDC). A discussion followed on the ISO guide, the ANSI standards, and what has been adopted by NIST. Dr. Gogolak offered that the Multi-Agency Workgroup is not proposing to bring something into the MARSSIM revisions that is overly complex or un-tested, and in actual practice, it should be easier to implement.

Dr. Preston appreciated the Bayesian framework for treatment of uncertainty.

Dr. June Fabryka-Martin observed that regarding Charge Question #3, we never discussed criteria or DQOs for the different updates that we have seen. Dr. Kahn suggested looking at criteria that have more scientific value. Dr. Fabryka-Martin suggested considering the advantages of making or not making the updates might be helpful in the decision-making process. She thought that the difficulty of obtaining “buy-in” by different parties is one factor among many that could have an impact on the final choices made as to what revisions ought to be incorporated into MARSSIM Revision 2. Also, the potential for “back fire” or negative feedback of a more daunting or complicated activity and the variety of approaches by different users, and how all this might lead to the potential for making the wrong decision are also important factors to consider. She suggested that it is exceptionally important to maintain the MARSSIM reputation for easy and complete guidance and field-friendly reference as “the “place to go” with the recommended Revision #2 of MARSSIM.

Ms. Snead acknowledged that nearly ½ of the current MARSSIM document consists of appendices. She thought that there is a need to update the list of instrumentation, which is currently handled in Appendix H.

Schedule Discussion: At 3:12 pm, Dr. Kahn asked all the RAC participants to kindly provide individual responses to the materials that they wish to respond to, including the 3 Charge Questions.

Ms. Snead indicated that the Multi-Agency Workgroup is planning to meet at the end of August or early September, and would appreciate receipt of the individual consultative comments for the Workgroup members to consider as they ponder what next steps to take on MARSSIM Revision #2.

A discussion followed by the RAC augmented for this MARSSIM consultative activity on whether there is a need to work toward a consensus. Dr. Kooyoomjian, as DFO, clarified that since this is a consultative activity where individual expert opinion is explicitly being sought, each member is asked to provide their individual comments, and there will be no attempt to seek consensus, or edit individual expert comments that are provided.

Dr. Mary Clark of ORIA explained that ORIA came to the SAB seeking a consultation on the MARSSIM proposed Revision #2, recognizing both the advantages and limitations of a consultation. The RAC members likened the consultative activity to “brain-storming” on a given topic. Dr. Clark expressed her view that the value of the consultation is that there is a range of views which are typically provided, that there is value in informal dialogue, and that all the

products are individual comments, in which individual expert opinion and feedback is essentially immediate.

Dr. Kahn appealed to the participants to keep in mind the three charge questions as they ponder setting their individual written comments and opinions into written form.

Ms. Snead thanked the participants for the opportunity to have such a fruitful and open discussion on the topic over the past two sessions. She expressed the appreciation of the Multi-Agency MARSSIM Workgroup members to have the opportunity for such a good interaction on Day #2 with the RAC members.

Action Items from the July 27, 2011 Public Conference Call:

This brief summary captures those items of interest to the augmented RAC as follows:

- 1) The augmented RAC members are encouraged to provide individual written comments and observations within a couple of weeks, as their individual schedules allow. These written comments should be provided directly to the DFO, Dr. Kooyoomjian for transmission through the EPA representatives on the Multi-Agency MARSSIM Workgroup;
- 2) Dr. Kahn thought that the draft minutes could be prepared and transmitted to the augmented RAC by August 10th and finalized with first corrections version of the minutes could be ready by September 9, 2011; and
- 3) While each participant in the MARSSIM consultation exercise is encouraged to comment on any item, Dr. Kahn reminded everyone to please do not forget to comment on the three charge questions as you see appropriate. The summary of the individual expert comments from the RAC augmented for this consultation is attached¹¹.

ADJOURN: After having summarized the action items, there being no additional items to discuss, Dr. Kahn thanked the participants and adjourned the meeting at 3:43 pm.

Respectfully Submitted:

Certified as Accurate:

_____/S/
K. Jack Kooyoomjian, Ph.D.
Designated Federal Official
Radiation Advisory Committee (RAC)
Augmented for Consultation of
MARSSIM Revision #2

_____/S/
Dr. Bernd Kahn, Chair
Radiation Advisory Committee (RAC)
Augmented for Consultation of
MARSSIM Revision #2

MATERIALS CITED

The following materials can be accessed through the SAB Website at (www.epa.gov/sab) at the following hotlink:

<http://yosemite.epa.gov/sab/sabproduct.nsf/MeetingCal/679AD3E0E94ED46D852578BF0070D99C?OpenDocument>

¹ Roster of Radiation Advisory Committee (RAC) Augmented for MARSSIM Consultation;

² Federal Register Notice Announcing the Meeting (FR Vol 76, No. 132,P.40726, July 11, 2011);

³ Charge for Radiation Survey Manual (Multi-Agency Radiation Survey and Site Investigation Manual) Revisions;

⁴ Meeting Agenda, RAC Augmented for MARSSIM Consultation, July 26 & 27, 2011;

⁵ Health Physics Society formal written comments on proposed revision to the Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM):

⁶ Comments by Robert A. Meck for Revision 2 of MARSSIM Provided on July 24, 2011 at 4:42 PM;

⁷ MARSSIM Revision 2 Consultation with the SAB-RAC, July 26, 2011 presentation by Katherine Snead, MARSSIM Workgroup Chair;

⁸ Agency Response to SAB MARSSIM Review EPA-SAB-RAC-97-008;

⁹ ATTACHMENTS A, B, and C for Consultation on Proposed Upgrades to the Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM);

[NOTE: ATTACHMENT A contains MARSSIM Revision 1 (August 2000) including June 2001 Updates Roadmap pages 2-15; ATTACHMENT B contains a Summary of Comments Received from Request for Public Input on MARSSIM Revisions pages 16-25; ATTACHMENT C contains Considerations for Revision 2 to MARSSIM, page 26 listing 7 proposed recommendations from the Multi-Agency Workgroup.]

¹⁰ Supplemental Information for the SAB-RAC for 7/27/11 from Ms. Kathryn Snead, MARSSIM Workgroup Chair; and

¹¹ Compendium of Individual Commentaries by the SAB/RAC Augmented for MARSSIM Consultation Pertaining to Considerations for MARSSIM Revision 2.